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10/712,732	11/12/2003	Drew D. Perkins	P026	9275

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EXAMINER	
PHAM, BRENDA H	
ART UNIT	**PAPER NUMBER**
2616	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/712,732	PERKINS ET AL.	
	Examiner	Art Unit	
	BRENDA PHAM	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06/27/08*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-111* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-111* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *02/19/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The Restriction Requirement dated 03/27/08 has been reconsidered and is vacated. Claims 1-111 has been examined as follow:

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-16, 18-27, 29-34, 36-40, 42-45, 47-51, 53-58, 60-76, 86-89, 103, 107-111 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art (AAPA) in view of Lundby et al (US 7,158,498 B2) further in view of PUC (US 6,341,023 B1).

Regarding claim 1, 23, 34, 58, 70 and 91, AAPA discloses a transmission network and method having a transmitter side and receiver side, comprising (figure 3):

said transmitter side comprising:

a data source **(DATA SOURCE)** for providing a multiplexed M signal of M signals in a first domain modulated at a first baud rate;

FEC encoder **(FEC ENCODER)** for encoding the multiplexed M signal;

a converter **(EO CONVERTERS)** for converting the N signal segments in the first domain **(demultiplexed signals 1…n)** into N signal segments of a second domain **(wavelength 1…n)**; and

a combiner **(1:N MUX)** for combining the N signal segments in the first domain into a combined signal in the second domain into a combined signal in the second domain for transport on a transmission medium;

said receiver side comprising:

a decombiner **(1:N DEMUX)** for receiving said combined signal in the second domain from the transmission medium and decombing said combined signal into N segments in the second domain;

a converter **(OE CONVERTER)** for converting the N segments in the second domain into N segments in the first domain;

a multiplexer **(N:1 MUX)** for converting the first domain N segments at a first baud rate into a multiplexed M signal at a second baud rate comprising said first domain M signals each at the first baud rate; and

FEC decoders **(FEC DECODER)** for decoding the multiplexed M signal.

AAPA does not disclose a single FEC encoder for encoding the multiplexed M signal and a single FEC decoder for decoding the multiplexed M signal.

Lundby, in the same field of endeavor, teaches **"The frame formatter 100 is operationally coupled with a forward error correction (FEC) module 102, which adds forward error correction codes to the data stream. The FEC module 102 may be any of several forward error correction techniques, including turbo-coding convolutional coding, or other form of soft decision or block coding...After FEC coding, the data is processed by a demultiplexor, or demux 104, which is operationally connected to the FEC module 102. Demux 104**

distributes the error correction coded symbols into different groups, each of which is processed separately until transmission."" col. 6, lines 1-15

PUC, in the same field of endeavor, suggests the transmitter system and receiver system can be configured in series so that the transmitter system has a single FEC encoder, multiple-level formatter and optical transmitter, and so that the receiver system has a single optical receiver, multiple-level discriminator and FEC decoder. Col. 3, lines 50-60).

Using a number of FEC encoder/FEC decoders are not specified and remain design choices.

Therefore, it would have been obvious to those having ordinary skill in the art at the time of the invention was made to implement a single FEC encoder and a single FEC decoder in AAPA, such as that taught by Lyndby to reduces complexity, power and cost.

Regarding claims 11 and 45, AAPA in view of Lundby discloses the method of claim 1. Lundby further teaches providing a plurality of M signals multiplexed in the first domain **(Frame Formatter 100)**;

FEC encoding the multiplexed M signals in a first domain **(FEC CODER 102)**;

Inverse multiplexing the first domain signals into separate N signals in the first domain **(DE-MUX 104)**.

AAPA further teaches converting the first domain N signals into N signals in a second domain **(FIG. 3 shows converting the FEC encoded signals into optical signal, EO CONVERS);** and

combining the second domain N signals into a combined signal for transport on a transmission medium **(FIG. 3 shows N:1 MUX)** combining the second domain N signals into a combined signal optical signal.

It would have been obvious to those having ordinary skill in the art at the time of the invention was made to modify the teaching of AAPA with the teaching of using a single FEC encoder and inverse multiplexing steps as taught by Lundby to reduces complexity, power and cost comparing to the use of several encoders and decoders implemented in parallel, with one encoder decoder for each channel.

Regarding claims 2, 12, 36, 47, 72 and 92, AAPA teaches wherein the first domain signal is at a first baud rate and the first and second domain signal N segments are at second baud rate **(Figure 3 illustrates Data source is at a first baud rate and a first and second domain signal N segments (wavelengths 1 through n) are at second baud rate.)**

Regarding claims 3, 13, 24, 37, 48, 60, 73, 94, AAPA (FIG. 3) teaches wherein the first baud rate is higher than the second baud rate **("the data source may be a high bit or baud rate source which is FEC encoded and inverse multiplexed where**

the data signals is demultiplexed by 1:N DEMUX into multiple lower baud rate." [0010])

Regarding claims 5, 15, 26, 50, 75, 96 AAPA in view of Lundby further teaches wherein the first and second baud rates are the same.

Regarding claims 6, 16, 27, 40, 51, 63, 76 and 97, AAPA teaches wherein the first and second baud rates are in Kbps, Mbps, Gbps or Tbps **("The purpose of FEC systems in FIGS. 3 and 4 of patent '904 is to provide for upgrade in the signal baud rate, such as from a 2.5 Gbps system to meet the requirements of a 10Gbps system, toward reducing the effects of optical channel impairments at higher data rates in order to achieve an improved system optical signal-to-noise ratio (OSNR). [0010])**

Regarding claims 8, 18, 29, 42, 53, 65, 86 and 107, AAPA teaches wherein the first domain is an electrical domain and the second domain is an optical domain **(Figure 3, transmitter).**

Regarding claims 9, 19, 30, 43, 54, 66, 87, 108, AAPA in view of Lundby further teaches wherein the first domain is an electrical domain and the second domain is an electrical domain (Lundby: FIG. 2).

Regarding claims 10, 20, 31, 55, 67, 88 and 109, AAPA teaches wherein the first domain is an optical domain and the second domain is an electrical domain **(Figure 3, Receiver).**

Regarding claims 4, 14, 25, 38, 49, 61, 74 and 95, AAPA teaches wherein the second baud rate is higher than the first baud rate **("At the optical receiver, the reverse of the forgoing occurs, i.e., the multiplexed optical signal is demultiplexed by a 1:N DEMU and the optical signals are converted into electrical signals by the optical receivers,...FEC decoded and then inverse multiplexed to provide, again, a higher baud rate signal which is provided to a data sink, such as client equipment via a client tributary interface. [0010])**

Regarding claims 21, 32, 56, 68, 89 and 110, AAPA further teaches wherein the first domain is an optical domain and the second domain is an optical domain (see figure 3).

Regarding claims 22, 33, 57, 69, 90 and 111, AAPA teaches wherein the transmission medium is an electrical medium or an optical medium depending upon, respectively, whether the second domain is an electrical domain or an optical domain **(Figure 3 shows an optical transmission medium).**

Regarding claim 71 and 92, AAPA teaches wherein said data source comprises of a plurality of M data sources **(DATA SOURCE 2)** providing M signals at a first baud rate and a multiplexer to combine said M signals into said multiplexed M signal of M signals **(Figure 4 of 6,433,904 (AAPA) shows multiplexed of Data Source 2 into a multiplex signal between data source 2 and Demux 50).**

4. Claims 7, 17, 28, 41, 52, 77-85, 90-102, 104-106 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art (AAPA) in view of Lundby et al (US 7,158,498 B2) further in view of PUC (US 6,341,023 B1) and furthermore in view of Joyner et al (US 7,058,246 B2).

Regarding claims 7, 17, 28, 41, 52, 64, 77, 98 and 103 AAPA in view of PUC does not disclose wherein the step of converting comprises a monolithic photonic integrated circuit (PIC) having integrated N signal channels for converting a respective signal segment in the first domain into a signal segment in the second domain and multiplexing the N channel signal segments to form the combined signal.

Joyner, in the same field of endeavor, teaches this claimed limitation**. Joyner teaches "A monolithic photonic integrated circuit chips comprises an array of modulated sources providing channel signals of different wavelengths; and an optical combiner coupled to receive the channels signals and produce a combined output of the channel signals. The arrays of modulated sources formed as ridge waveguides to enhance the output power from the respective modulated sources.**

Joyner further teaches "The inventive monolithic photonic integrated circuits provide improved output performance and quality that does not require or need on chip amplification.

Therefore, it would have been obvious to those having ordinary skill in the art at the time of the invention was made to implement a transmitter monolithic photonic integrated, such as taught by Joyner et al, in AAPA in view of PUC for improved output performance and quality.

Regarding claim 78-79, 82-83, 99-100, 104, Joyner further discloses wherein said first domain comprises an electrical domain and said second domain comprises an optical domain; said monolithic photonic integrated circuit (PIC) comprises an array of N laser sources, an array of N optic-electric modulators and an optical combiner to combine N optical signal segments into said combined signal for transport on said transmission medium; said transmission medium comprising an optical fiber **("A TxPIC chip, as disclosed, comprises an array of modulated sources, preferably DFB lasers and optically coupled EA modulators, with the modulated outputs of the coupled to an integrated optical combiner, preferably an arrayed waveguide grating (AWG), from which the multiplexed output is presented at a facet output for optical coupling to an optical transport network or optical telecommunication system." Col. 4, lines 38-45)**

Joyner further teaches **"The DFB lasers and EA modulators are optimized for highest output power, with improved chirp and extinction ratio as well as**

minimized insertion loss at the modulator, so that any need for on-chip signal amplification, such as semiconductor optical amplifier (SOA), or a semiconductor optical laser amplifier or GC-SOA is eliminated." Col. 4, lines 45-50).

Therefore, it would have been obvious to those having ordinary skill in the art at the time of the invention was made to use the TxPIC chip, such as taught by Joyner for optimized highest output power and improved chirp and extinction ratio as well as minimized insertion loss at the modulator.

Regarding claims 80 and 101, Joyner discloses wherein said electro-optic modulators comprise an array of electro-absorption modulators or Mach-Zehnder modulators **("the modulated sources are one of distributed feedback (DFB) lasers...Mach-Zehnder modulator, col. 23, lines 63-67).**

Regarding claims 81, 84, 102, 105, Joyner discloses wherein said optical combiner comprises an arrayed waveguide grating (AWG) or an Echelle grating **"Reference is now to FIGS. 5 and 6....an array of EA modulators 14 and an optical combiner 21 which in FIG. 5 may be comprised of a multimode interference (MMI) coupler, an Echelle grating, a star coupler or an arrayed waveguide grating (AWG)." col. 9, line 25-45).**

Regarding claims 85 and 106, Joyner further teaches wherein said array of photodetectors comprise an array of PIN photodiodes or an array of avalanche

photodiodes **("Also, optional arrays of photodiodes (PDs) 11, 13 and 15, for example, in the form of PIN photodiodes, may be provided at the back at 11 and/or front at 13 of each of the DFB lasers 12 and/or at the output of the EA modulators at 15 to respectively monitor the DFB power....Also to be noted is that photodetectors 15 at the output of EA modulators 14 may alternatively be selectively forward (reversed) biased to provide fro gain (loss) equalization of output power across the wavelength grid or 16 may also be alternatively or additionally positioned between each DFB laser and EA modulator as is the case of photodiodes 13, rather than after each EA modulator 14. Further, the use of PIN photodetectors at both locations 13 and 15 would allow for a larger dynamic range of output power equalization", col. 9, lines 45-65).**

5. Claims 35, 46, 59 and 93 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art (AAPA) in view of Lundby et al (US 7,158,498 B2) further in view of PUC (US 6,341,023 B1).furthermore in view of McCalley et al (US 5,191,410).

Regarding claims 35, 46, 59, and 93, AAPA in view of PUC and Lundby disclose all the claimed limitation recited in parent claims (1, 23, 34, 58, 70, 91).

AAPA in view of PUC and Lundby does not teach demultiplexing the FEC decoded multiplexed M signal into a plurality of M signals in the first domain and forwarding the M signals to a respective data sink. This claimed limitation is taught by McCalley (see FIG. 10).

It would have been obvious to those having ordinary skill in the art at the time of the invention was made to demultiplexing the FEC decoded multiplexed M signal and forward the M signal to a respective sink.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brenda Pham whose telephone number is (571) 272-3135. The examiner can normally be reached on Monday-Friday from 9:00 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynn D. Feild, can be reached on (571) 272-2092.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (571) 272-2600.

September 9, 2008

/Brenda Pham/

Primary Examiner, Art Unit 2616